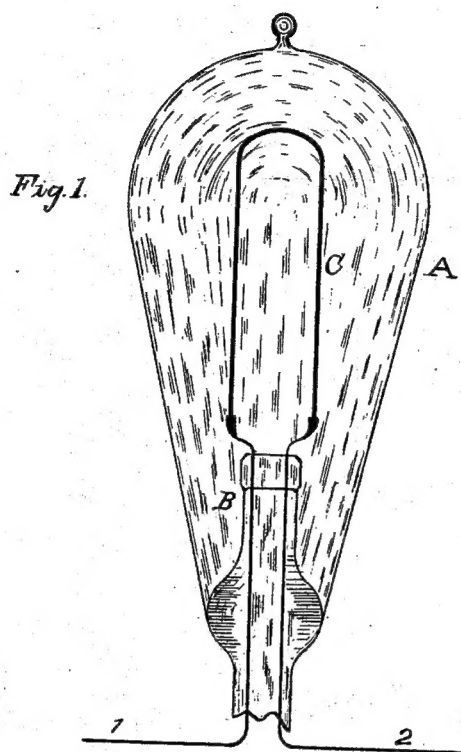


(No Model.)

T. A. EDISON.
INCANDESCING ELECTRIC LAMP.

No. 274,294.

Patented Mar. 20, 1883.



ATTEST,
E. C. Rowlands,
Witness

INVENTOR,
Thomas A. Edison,
By Richd. N. Dyer,
Att'y.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY.

INCANDESCING ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 274,294, dated March 20, 1883.

Application filed November 23, 1882. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Menlo Park, in the county of Middlesex and State of New Jersey, have invented a new and useful Improvement in Incandescing Electric Lamps, (Case No. 515,) of which the following is a specification.

The object I have in view is to produce flexible carbon filaments for the incandescing conductors of electric lamps which shall be of high resistance and of even resistance throughout their length, and shall have great flexibility and toughness, so that they will not be liable to be fractured by the expansion and contraction, more or less unequal, which take place from the lighting and extinguishing of the lamp.

To this end my invention consists in an incandescing conductor for an electric lamp, formed of a number of fine continuous filaments massed together, so as to be in close contact throughout the whole length, and having their ends secured, the said individual filaments being capable of independent expansion and contraction throughout the length of their bodies, between the ends, where they are brought together into solid and homogeneous masses.

In carrying out my invention I preferably take several long and very fine fibers of the same or almost the same length—such as those of ramie, flax, and similar vegetable substances—and twist them tightly together, so as to form a fibrous thread. The ends are secured preferably by a plastic carbonizable substance attached to them, such as a compound of carbon and sugar. The filament thus formed is carbonized under strain or pressure, or both, and may be bent, either before or after carbonization, into the desired form. The plastic compound upon the ends of the filament may form enlarged ends for clamping. The separate filaments are not secured together by carbonization, but remain free, except at their ends, where they become solid homogeneous masses of carbon. The ends of the twisted filament are then attached to the leading-in wires sealed in the stem or tube of a lamp; and are preferably electroplated to such wires, the fibers, before electroplating, being again twisted tightly, so as to bring them all in contact with each other through their entire

length. Instead of the process described, the fibers may be carbonized straight and separately, and such carbonized fibers then twisted tightly together. The ends are then attached to the leading-in wires, preferably by electroplating, the fibers being kept tightly twisted during this process. The filament formed in either of the above ways and attached to the leading-in wires is placed in the globe of a lamp in the usual manner, and is ready for the exhausting process.

While, as stated, I prefer to use natural vegetable fibers, it is evident that a conductor of the kind described may be formed of other substances—such as cellulose, paper, parchment, fine thread treated with hydrofluoric acid, &c.—fine filaments of such substances being twisted together, as described. It will be understood that the fiber is reduced to cellulose before the separate filaments are massed together, in order to maintain the individuality of the separate filaments after carbonization. Filaments may, it is evident, be braided or intertwined instead of twisted together.

Filaments formed as described are of unusually even resistance and incandescence, as each of the fibers is continuous, extending the whole length of the filament. The filament is also exceedingly flexible and elastic, and therefore well adapted for the purpose for which it is to be used. The expansion and contraction of the solid carbon filament which take place during the use of the lamp are more or less unequal, and for this reason it is liable to be fractured; but by the use of a carbon filament made up of a number of separate filaments capable of independent expansion and contraction this danger is greatly diminished.

In the accompanying drawings, Figure 1 is a view of an incandescing electric lamp embodying my invention; and Fig. 2 represents a portion of the twisted filament, the size thereof being of course greatly exaggerated.

A is the inclosing globe, and B the inner stem, through which pass the leading-in wires 1 2, to which are attached the ends of the carbon filament C, which is formed of a number of individual fibers, *c c*, twisted together, and secured together at their ends by a plastic substance, *a*.

What I claim is—

1. A flexible carbon filament for the incan-

descing conductor of an electric lamp, formed of a number of separate continuous flexible carbon filaments massed together, substantially as set forth.

5 2. A flexible carbon filament for the incandescing conductor of an electric lamp, formed of a number of continuous individual carbonized natural fibers massed together, substantially as set forth.

10 3. A filament for forming, on carbonization, the incandescing conductor of an electric lamp, consisting of a number of separate filaments, of carbonizable material, massed together, and secured at their ends by a plastic carbonizable
15 compound, substantially as set forth.

4. A flexible carbon filament for incandescing electric lamps, formed of a number of

separate flexible carbon filaments with their ends connected in solid homogeneous masses, substantially as set forth. 20

5. The combination, in an incandescing electric lamp, of a chamber made entirely of glass, leading-in wires passing through and sealed in the glass of said chamber, and a flexible carbon incandescing conductor formed of a 25 number of separate filaments massed together and secured to said leading-in wires, substantially as set forth.

This specification signed and witnessed this 13th day of November, 1882.

THOS. A. EDISON.

Witnesses:

H. W. SEELY,
EDWARD H. PYATT.